DRAWING AMENDMENTS:

Please replace sheet 1/4 of the drawings presently appearing in the application with the enclosed replacement sheet 1/4.

REMARKS

This is responsive to the Official Action dated October 23, 2006 in this application (the "Official Action"). The examiner's withdrawal of all previous rejections based on the art of record is noted with appreciation.

The Objections to the Drawing and Claim 25

Concerning the drawing objection and claim objection of paragraphs 4 and 5 of the Official Action, the equations referred to as being different are actually the same, but the subscripts referring to the i, j and k^{th} exemplary elements to which the equations apply have been inconsistent among the specification drawing and claim. Applicants agree that these should be consistent throughout and appropriate amendments have been made in the drawing Fig. 2 and in claim 25.

The Supplemental Reasons for Allowance

The examiner's comments, at paragraphs 18 - 22 of the Official Action, in regard to the applicants' requested withdrawal of the claim interpretations set forth in the post-issuance Supplemental Reasons for Allowance, are noted. Applicants agree that claims should be given their broadest reasonable interpretation. Applicants also agree that limitations appearing in the specification, but not recited in the claims, are not read into the claims. Applicants are not in agreement with the examiner's further comments and do not believe the comments support the claim interpretations of the previously issued Supplemental Reasons for Allowance. The deficiencies of the claim interpretations expressed in the Supplemental Reasons for Allowance have been set forth sufficiently in the record to prevent those claim interpretations resulting in any similarly incorrect claim interpretations in regard to a patent issuing on this application. The

application has been withdrawn from allowance and so the Supplemental Reasons for Allowance no longer apply. In addition the claim interpretations expressed there have not subsequently been applied by the examiner in the continuing examination of this application. Consequently, the Supplemental Reasons for Allowance and claim interpretations expressed therein are moot and are believed to require no further attention.

In the "Examination Considerations" at page 10 of the Official Action, paragraph 20 relates to "Examiner's Notes." However, applicants are unaware of any examiner's notes received in the prosecution of this application. The examiner's discussion at paragraph 2 appears to bear no relationship to the application or its examination, so no response is believed necessary.

Similarly in the "Response to Arguments" section of the Official Action beginning on page 19, the statement in paragraph 16, that "¶20 applies," is not understood since the paragraph does not appear to be relevant.

The Outstanding Rejections on Other Than Prior Art

The rejections in the Official Action based on failure to disclose best mode, lack of utility, two grounds of non-statutory subject matter and for failure to disclose a "practical application for the invention" are, it is urged, each erroneous and should be withdrawn. It is noted that this application has been reviewed five times previously with none of these current non-art-related rejections ever having been raised.

The Best Mode Rejection

Claims 7, 8, 17, 22, 23, 24, 26, 29 and 32 have been rejected because the best mode contemplated by the inventors has not been disclosed." This rejection is in error and is respectfully traversed.

The best mode requirement of 35 U.S.C. § 112 is a requirement relating to an application's description of the invention. This requirement relates to the specification, not to the content of the claims. Section 112, first paragraph states, "The specification ... shall set forth the best mode contemplated by the inventor of carrying out his invention." The detailed Description beginning at page 3 of this application and continuing through page 11 describes the best mode contemplated by the applicants to carry out the invention.

The examiner quotes from statements in the applicants' Background of the Invention contrasting oscillatory neural networks, which include oscillators, with other neural networks, which do not include oscillators. The statement, which is not directed to the present invention, but to the state of the art, is misconstrued in the Official Action to mean, apparently, that the best mode of an oscillatory neural network must not include amplifiers. The Official Action concludes that somehow because the preferred embodiment of the invention includes an amplifier in its oscillatory circuitry that claims to the oscillatory neural network including the amplifiers "conceal" the invention. In the Official Action it is never said what is believed to be "concealed."

To the extent that this description can be considered inconsistent with a statement regarding the prior art as described in the Background of the Invention, then it is the statement in the Background that needs clarification. This has been done in the amendment to page 2 of the application.

In other words, insofar as the examiner may have misunderstood the statement at page 2 of applicants' Background of the Invention, "Simply stated, the elements of an oscillatory neural network computer consist of oscillators rather than amplifiers or switches," that statement has been revised to read "Simply stated, an oscillatory neural network computer includes oscillators."

There has been no "concealment" of the applicants' best mode of practicing the invention. The applicants' best mode as of the time of filing the application is set forth in the Summary of the Invention, the drawings and the Detailed Description, just as is required by 35 U.S.C. § 112. Withdrawal of the "best mode" rejection of claims 7, 8, 17, 22, 23, 24, 26, 29 and 32 is respectfully requested.

Lack of Utility

Claims 1 - 5 and 9 - 39 stand rejected under 35 U.S.C. § 101 because, the Official Action avers, "the claimed invention lacks patentable utility." It is respectfully urged that this rejection is in error and should be withdrawn. Section 101 of 35 U.S.C. does not address the claims of an application, but rather states that one who "invents or discovers any new and useful process, machine, manufacture, or composition of matter ... may obtain a patent, subject to the conditions and requirements of this title." The invention described in this application is both new and useful.

In respect to a number of the claims the examiner cites features of the preferred embodiment of the disclosure and drawings and holds that the claims are drawn to an inoperative embodiment because the claims omit that particular feature. There is no requirement that claims of an application recite all parts of an apparatus needed for the apparatus to operate.

For example, with respect to claim 1, the Official Action states:

> Claim 1: limits "the weighting network ... having outputs operably coupled to inputs of the phase-locked loops." Fig. 1 requires a BPF.

However, claim 1 does not exclude the band pass filters. The claim states "operatively coupled," not "directly electrically connected." The outputs of the weighting network are coupled to inputs of the phase-locked loop circuits via the band pass filters as shown in Fig. 1.

Although in the preferred exemplary embodiment the weighting network outputs are coupled to the phase-locked loop circuits by the band pass filters, this need not always be the case. In other embodiments of the invention the outputs of the weighting network may be coupled to the phase-locked loop circuits in another fashion, directly, for example. To require inclusion of the band pass filters would unduly narrow the claims beyond what any prior art requires.

New claim 40, dependent from claim 1, makes explicit the coupling of the weighting circuit outputs to the phase-locked loop circuits via the band pass filters. The examiner's comments regarding the rejection expressed in the Official Action as to claim 1, under 35 U.S.C. § 101 do not apply to claim 40.

Concerning the rejection of claims 2 and 3 under 35 U.S.C. § 101, the rejection is, it is urged, incorrect as a matter of law since § 101 is not the applicable statutory section. That having been said however, the examiner's point is well taken that claim 2 should recite that the second input terminal of the first adder circuit is coupled to the output terminal of the second weighting circuit. The claim has been so-amended. Likewise, claim 3 has been amended to similarly correct it. The examiner's careful reading of these claims is appreciated.

No specific mention is made of claim 4 regarding its rejection under § 101. Applicants therefore understand the rejection to relate to claim 4's dependence from claim 2. The amendment to claim 2, it is urged, overcomes the rejection of claim 4 under § 101.

In regard to claims 5, 10, 16 and 31, the outstanding Official Action states:

> Claims 5, 10, 16, 31: limits "first initialization input terminal coupled to the first adder circuit." Fig. 1 does not identify such initialization input.
>
> Claim 10: limits "the weighting circuit further includes a plurality of initialization input terminals.

This is incorrect it is urged. At page 5, lines 7 - 10, referring to Fig. 1, the specification in this application states:

> Further, initialization input terminals IN_1, IN_2, ..., IN_{N-1}, IN_N are coupled to initialization input terminals of adder circuits 31_1, 31_2, ..., 31_{N-1}, 31_N, respectively. The output terminals of adder circuits 31_1, 31_2, ..., 31_{N-1}, 31_N are connected to the input terminals of bandpass filter circuits 35_1, 35_2, ..., 35_{N-1}, 35_N, respectively.

The rejection of claims 5, 10, 16 and 31 based on 35 U.S.C. § 101 should be withdrawn and that withdrawal is respectfully requested.

As to claims 11, 15, 17 and 25, the outstanding Official Action states:

> Claims 11, 15, 17, 25: limits "... each connector has a phase-encoded connection coefficient..."; "... phase-locked loops having a plurality of oscillators operably coupled with said plurality of connectors..." A connector is typically either an input type or output ... Claim fails to function with an input type connector for the phase-encoded connection coefficient ... wrong connection.

Similarly, as to claim 12, the Official Action states:

> Claim 12: limits: "... a plurality of oscillators operably coupled with said plurality of connectors ... a plurality of adder circuits coupled between the plurality of connectors and said plurality of oscillators." Non-functional arrangement; see Fig. 1 and comments related to claim 11 above.

These rejections appear to be further examples of the citing of § 101 to require a further, more specific claim recitation as discussed above. This is not a proper claim rejection. Section 101 of the patent statute makes no requirement that a claim contain all limitations needed to construct a functional embodiment of the invention. These rejections should now be withdrawn as incorrect as a matter of law.

Additionally, as to these rejections of claim 11, 12, 15, 17 and 25, there is no support for the statement in the Official Action that "A connector is typically either an input type or output." Further, it is not understood what is meant by "claim fails to function with an input type

connector for the phase-encoded connection coefficient ... wrong connection." The type of connector intended is accurately expressed in the claims 11, 12, 15, 17 and 25 and these rejections should be withdrawn for that reason as well.

Should the rejections of claims 11, 12, 15, 17 and 25 under 35 U.S.C. § 101 be repeated, it is respectfully requested that the examiner (1) cite legal authority for the rejection of claims on this basis, (2) provide support for the statement that a connector is typically either an input type or output, and (3) explain what is meant by the statement that "claim fails to function, etc."

As to claim 13, the Official Action states:

> Claim 13: limits "a plurality of adder circuits coupled between the plurality of connectors and said plurality of oscillators ..." Claim is non-functional on a by-pass of BPF.

It is not understood what is meant by "claim is non-functional" or "on a by-pass of BPF." There is no statutory basis for rejecting a claim as "non-functional." If as in the case of claim 1, above, the "by-pass of BPF" means that the examiner is attempting to require inclusion of the band pass filter, see the above comments regarding the rejection of claim 1 under 35 U.S.C. § 101. In the preferred exemplary embodiment of the Detailed Description, the adder circuits are coupled to the plurality of oscillators embedded (the VCOs of the phase-locked loops) by the band pass filters. So the plurality of band pass filters 35 of the preferred exemplary embodiment described in the Detailed Description and illustrated in Figs. 1 and 2 are indeed coupled between the plurality of adder circuits 31 and the embedded voltage controlled oscillators of the phase-locked loops 25 as claimed in claim 13. Claim 13 does not say that the adder circuits are directly electrically connected to the oscillators and the claim is intentionally drawn broadly enough to allow coupling the adder circuits to the oscillators of the phase-locked loops in ways other than through the band pass filters.

Note new claim 41, dependent from claim 13, does expressly state that the adder circuits are coupled to the oscillators via the band pass filters. Consequently the comments of the Official Action regarding the rejection of claim 13 under 35 U.S.C. § 101 do not apply to claim 41.

Regarding the rejection of claim 26 under 35 U.S.C. § 101, the Official Action states: "Claim 26: limits fail to reflect the disclosed operation of Fig. 1 and Fig. 2." It is not clear what this means. However to the extent that this rejection relates to the claim's not explicitly requiring the connection of the phase shift circuit to the phase-locked loop via a band pass filter, see the above comments regarding the rejections of claims 1 and 13. This rejection, it is urged, should now be withdrawn.

In rejecting claims 27, 30 and 32 under 35 U.S.C. § 101, the Official Action states:

> Claim 27, 30, 32: limits: "... the phase shift circuit is operably coupled to the one of the phase-locked loops through an adder and a band pass filter." If the adder and the band-pass filter run in parallel, the result is non-functional.

However, there is no requirement explicit or implicit in 35 U.S.C. § 101 requiring that a claim be written to exclude every nonfunctional embodiment. Also it is improper, it is urged, for the examiner to read into these claims a limitation (the parallel connection) making the claimed invention inoperative. Withdrawal of the rejection is in order and is requested.

Note that dependent claim 42 expressly calls for series connection of the adder circuit and the band pass filter between the phase shift circuit and the phase-locked loop.

Regarding claim 28, the Official Action states:

> Claim 28: the connection strengths are of a different form to that identified in Fig. 2.

Although this is not a valid basis for a rejection of a claim under 35 U.S.C. § 101, the discrepancy has been corrected as set forth above and the matter is now moot. The rejection should be withdrawn.

Regarding claim 29 and the rejection under 35 U.S.C. § 101, the Official Action states:

> Claim 29: limitation is simply not what is disclosed in Fig. 1 and Fig. 2 ... non-functional.

The foregoing comments respecting the rejection of claim 1, 13 and 26 apply. The claim is, in fact, drawn to what is disclosed: weighting circuits ($C_{1,1}$, $C_{1,2}$, etc.), each comprising an amplifier (23) operatively coupled to one of the output terminals (Out_1, Out_2, etc.) and a phase shift circuit (24) operatively coupled (through the band pass filters 35_1, 35_2, etc.) to one of the phase-locked loops (25_1, 25_2, etc.). This rejection is in error and should now be withdrawn.

As to claim 34, in relation to the rejection under 35 U.S.C. § 101, the Official Action states:

> Claim 34: limits "... the weighting network being outside the phase-locked circuits and having inputs operably coupled to outputs of the phase-locked loops and having outputs operably coupled to inputs of the phase-locked loops." ... non-functional without adder and BPF.

The rejection is similar to that applied to claims 27, 30 and 32 and the above comments addressing that rejection apply here as well. The rejection is in error and should be withdrawn.

Respecting claim 35, it is said in the Official Action:

> Claim 35: limits "... a plurality of phase-locked circuits operably coupled with said weighting network, wherein the network comprises a plurality of phase shift circuits each phase shift circuit connected in a weighting circuit external to the phase-locked circuits operably connected to an input of one of the phase-locked loops." Non-functional Non-functional to that of the disclosure illustrated in Fig. 1 and Fig. 2.

It is unclear what is meant by "non-functional to that of the disclosure illustrated in Fig. 1 and Fig. 2." However, the foregoing comments as to the erroneous nature of rejecting the claims under 35 U.S.C. § 101 apply, and to the extend that the examiner contends that further features of the preferred exemplary embodiment of Figs. 1 and 2 and the Detailed Description must explicitly be claimed, this is incorrect and claim 35 does, indeed, accurately claim the invention as pointed out above. The "weighting circuit external to the phase-locked loop circuits" is, in fact, connected (by an adder and a band pass filter) "to an input of one of the phase-locked loops." This rejection, too, should be withdrawn. There is no statutory or case law requirement that every element needed to make an invention functional has to be present in a claim if that is what "non-functional" is meant to say.

The Rejection Based on Non-statutory Subject Matter in Reciting a Signal

Claims 18 - 24, 36, 37, 38 and 39 stand rejected as directed to non-statutory subject matter because they "recite a signal." This rejection is baseless. These claims do not claim a signal, but methods and apparatus that act on a signal or signals.

No supporting law is cited for this rejection. The patent literature is replete with patents the claims of which recite operations on signals. A search of the U.S. Patent and Trademark Office website recovers 585,179 issued U.S. patents since 1976 reciting the term "signal" or "signals" in the claims. This rejection is not a proper rejection, it is clearly not recognized in the U.S. Patent and Trademark Office as such, and it is urged, it should be withdrawn. Should the examiner persist in this particular rejection, citations of supporting authority are requested.

Rejection on Non-Statutory Subject Matter - No Practical Application

At paragraph 11, page 6 of the Official Action, claims 1 - 35 of this application are further rejected as relating to non-statutory subject matter under 35 U.S.C. § 101. This is clear error.

Citing *Gottschalk v. Benson et al.*, 409 U.S. 63, at 71-72 (1972), the Official Action states, "the computer system must set forth a practical application of § 101 judicial exception to produce a real-world result." It is not clear what that sentence means. However, it is noted that the Benson case does not say that a patent application claiming a computer, its method of use or the method of programming must describe a practical application for the computer or the methods. As indicated in Section 2106 of the Manual of Patent Examining Procedure, p. 2100-13 (Rev. 5, Aug. 2006), the Benson case holds "Phenomena of nature, though just discovered, mental processes, abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work." *Benson*, 409 U.S. at 67, 175 USPQ at 675. One may not patent a process that comprises every "substantial practical application" of an abstract idea, because such a patent "in practical effect would be a patent on the [abstract idea] itself." *Benson*, 409 U.S. at 71-72, 175 USPQ at 676." The Benson case is related to a computer program patent application in which the Court held that the rejected claims would cover all uses of an algorithm and so were directed to an idea not to an actual process. This has no relation to the present claims which are drawn to particular structures of an oscillatory neural network computer (claims 1 - 18, 25 - 35), to methods of pattern recognition using such a computer (claim 19), and to methods of programming a neural network computer (claims 20 -2 4) using patterns to be learned to alter phase relationships of oscillatory computer elements.

The Official Action states that "The invention is ineligible because it has not been limited to a substantial practical application. Relationships of circuits, weights and phases are non-statutory." This is incorrect. Claims 1 - 35 in the application are directed to practical applications, namely the neural network computer, the method of pattern recognition using the computer, and the method of program using such a computer. To say that relationships of circuits, weights and phases are non-statutory misses the point; these can be and are the patentable features in many claims drawn to apparatus and methods.

This rejection goes on to state:

> The invention must be for a practical application and either:
>
> 1). specify transforming (physical thing - article) or
>
> 2). have the Final Result (not the steps) achieve or produce a
> useful (specific, substantial and credible),
> concrete (substantially repeatable/non unpredictable), and
> tangible (real world/non abstract) result
> (tangibility is the opposite of abstractness).

No statutory or judicial authority is given. As previously pointed out, the claims in this application relate to a specific construction of a neural network computer, to methods that produce pattern recognition by a neural network computer (a useful, concrete and tangible result) and to methods for programming a neural network computer (producing thereby a useful, concrete and tangible result).

The claims are not so broad as to read on non-statutory subject matter, as is made clear by the foregoing remarks. Withdrawal of this rejection for non-statutory subject matter under 35 U.S.C. § 101 is requested. If the examiner chooses to persist in this rejection it is requested that authority be cited for each of the above-quoted assertions as to what amounts to patentable subject matter and that the conclusory, blanket assertions expressed in the outstanding Official

Action be supported by reference to the particular recitation of the particular rejected claims of this application.

Improvements in devices that have known uses as well as methods of making and using such devices are regularly issued patents with no discussion of any ultimate practical use. An improved amplifier, or oscillator, or processor or memory need not have described its ultimate practical use in say a radio or a transmitter or a digital computer in order to be patented. A neural network computer is known in the art to be useful in many applications such as optical character recognition and other pattern resolution applications. See Neural Networks, C. Stergiou and D. Siganos at http://www.doc.ic.ac.uk/~nd/surprise_96/journal/vol4/cs11/report.html#Applications%20of%20networks for numerous applications for pattern recognition neural network computers. For example, referring to Neural Networks, "But to give you some more specific examples, ANN are also used in the following specific paradigms: recognition of speakers in communications; diagnosis of hepatitis; recovery of telecommunications from faulty software; interpretation of multi-meaning Chinese words; undersea mine detection; texture analysis; three-dimensional object recognition; hand-written word recognition; and facial recognition." In the patent literature see Shi et al., Unconstrained Handwriting Recognition, U.S. patent No. 7,164,794, re recognized use in optical character recognition; Cecala et al., Method and Computer Program Product for Identifying and Incorporating New Output Classes in a Pattern Recognition System During System Operation, U.S. patent No. 7,164,791, discussing prior art uses of neural network with pattern recognition capability; and Hausner et al., Object Detection Method and Apparatus, U.S. patent No. 7,167,123, recognizing neural network pattern recognition for image resolution (in weapon detection).

Also an example of a patent to a neural network computer that does not discuss the ultimate practical use of the invention is Goodnight et al., Hybrid Neural Network Generation System and Method, U.S. patent No. 7,162,461.

Furthermore, this application does indeed describe a practical application of the claimed neural network computer, its method of use and of programming. This is the resolution of the degraded image described at pages 8 - 10 in connection with Figs. 4 - 8. For all of the above reasons this rejection of claims 1 - 35 under 35 U.S.C. § 103 should now be withdrawn.

Failure to Disclose a Practical Application

Claims 1 - 5 and 9 to 39 of this application further stand rejected under 35 U.S.C. § 112 for failure to disclose how to practice the "undisclosed practical application." The Manual of Patent Examining Procedure cites Section 2107.01 (iv) which states that a rejection based on lack of utility under 35 U.S.C. § 101 must be accompanied by a rejection under 35 U.S.C. § 112 for failure to enable one skilled in the art how to use the invention. However, as indicated above, the rejection based upon lack of utility under § 101 is in error. Consequently, this rejection under § 112 is incorrect as well and should now be withdrawn.

The application does teach one ordinarily skilled in the art how to make and use the claims' neural network computer method of pattern recognition and method of programming the computer.

The Rejection of Claims 18, 19 and 20 Over the Kurokawa et al. Article

Claims 18, 19 and 20 stand rejected over Kurokawa et al., "A Local Connected Oscillator Network for Sequential Character Segmentation," 0-7803-4122-8/97 (IEEE, 1997). Claim 18

has been cancelled. Claim 19 has been rewritten in independent form to contain the content of claim 18. Claim 20 has been amended for clarification.

Method claim 19 relates to a "method for recognizing an incoming pattern." The relied upon Kurokawa et al. writing does not relate to pattern recognition at all. There is no pattern recognition in the work described in the Kurokawa et al. article. Rather, the article relates to image or "character" segmentation.

Method claim 19 calls for the step of "encoding connection coefficients of the neural network computer in accordance with phase representations of the learned pattern." Similarly, claim 20 requires "encoding connection coefficients for connected elements of the neural network in accordance with phase relationships among oscillatory signals of the neural network computer, which phase relationships are representative of the pattern to be learned." In the Kurokawa et al. article there is no "learned pattern" as in claim 19 or "pattern to be learned" as in claim 20.

Kurokawa et al. in the cited paper consider a locally-connected (nearest-neighbor) network with short-term plasticity. The connection weights are adjusted during each trial, but then reset to zero after the image segmentation is done. Kurokawa et al. need plasticity (i.e., synapse modification) to achieve better in-phase synchronization between oscillators corresponding to a connected object and out of phase synchronization between groups of oscillators representing different (disjoint) objects. There are no memorized patterns. In fact, any connectivity left from the previous "segmentation" attempt would be detrimental to the next segmentation. The network would have to be reset. In summary, in this paper there is no long-term memory such as would provide pattern recognition or "learning," only short-term synaptic modification to provide image segmentation.

Using the methodology of the present invention, the applicants create stable configurations of learned phase deviations that can then categorize subsequent inputs based on those learned stable configurations. The Kurokawa et al. paper teaches nothing like the method of the present invention. Because the relied-upon Kurokawa et al. publication does not meet all elements of claims 19 and 20, the rejection of claims 19 and 20 over the relied-upon Kurokawa et al. publication is in error and should be withdrawn.

Note that the amendments made to claims 20, 25 and 28 are for clarity.

Applicants request a one month extension of time for response to the outstanding Official Action through and including February 23, 2007. A check covering the fee for the extension and the additional claims fee is enclosed. No further fee is believed required, however, authorization is given to charge any additional fees associated with this communication to Deposit Account No. 070135. A duplicate copy of this sheet is enclosed.

Any questions or suggestions regarding the application or the amended claims submitted herewith should be directed to the undersigned attorneys for applicant at the telephone number listed below or by email to the email address listed below.

Respectfully submitted,

GALLAGHER & KENNEDY, P.A.

Date: February 23, 2007

By: Thomas D. MacBlain
Reg. No. 24,583
Donna H. Catalfio
Reg. No. 55,973
Attorneys for Applicant

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GALLAGHER & KENNEDY, P.A.

Date: February 23, 2007

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